TELEVISION

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Television, as we are receiving it, is the reception of silhouette moving pictures by radio. In the "Radio Atlas" of 1930 there are listed fourteen regular broadcasting stations that are transmitting television regularly on short wave.

The best reception, in this section, has come from the Jenkins Television Laboratory in Washington, D. C. Their transmission is of moving pictures in plain silhouette, without much detail. At present, Jenkins transmits two hours every evening, except Sunday, from eight until ten o'clock. Their program consists of short skits, similar to a "Crazy Cat" comedy.

CIRCUIT

The detector circuit is simple. It is inductively coupled to the aerial, and employs capacity coupled regeneration. Our best results were obtained with a U.X. 200 A.A. detector tube. In the detector circuit, we used plug-in coils which covered a range of twenty to two hundred meters. The radio frequency coils, when wound with large wire—number eighteen or larger—on a large diameter, were found to be very good. The variable condensers were of the capacities shown in the circuit diagram and were the modified, straight line frequency type. The condenser across the secondary was shunted by a small, three plate condenser to act as a vernier.

Plenty of grid leaks were found necessary to be on hand as the grid is very critical. The best results were obtained with a one-tenth megohm resistance in the plate circuit. The voltage applied to the plate circuit ranged from forty-five to ninety volts.

Although this circuit gave us the best results, any good detector circuit will give good results.

AMPLIFIER

The amplifier circuit is plainly shown in the accompanying diagram and may be followed with very little difficulty.

Due to the fact that amplification without any distortion is necessary, it is of the resistance coupled type. If transformer coupled amplification is used, pictures may be formed, but we found that they were almost beyond recognition.

A raytheon Kino-Lamp is connected as shown, so that a loud speaker may be used for sound reception between picture transmission and for facility in tuning the set.

SCANNING DISC

Thus far, the description of the radio set was probably nothing new for the average amateur. The scanning disc, however, will probably need some introduction.

The scanning disc is revolved at 900 R.P.M. in front of the Neon light. A small frame, the size of the picture to be received, is placed between the light and the disc, to shut off all unnecessary light. The picture then appears, when properly synchronized, as explained later, on the disc in front of the light and its frame.

The disc that we used was a 16-inch diameter, circular disc, of 3-16th inch bakelite, with forty-eight round apertures $\frac{1}{48}$ inch in diameter placed evenly on a spiral of .96 inch lead.

MOTOR

After trying out many different motors to turn the disc, including a specially built Edison Chromowatt motor, we used an induction motor taken from an old fan. To control the speed of the disc and synchronize with the received impulse, a carbon pile rheostat was used in series with the motor in order to provide very close speed regulation.

The induction motor was decided on because of the bad interference caused by commutator sparking of direct current and Universal type motors in spite of all we could do to filter it.

OPERATION

Tuning for television is very little different than tuning for phone. With the loud speaker in the circuit, tune for the desired station, which may be known by a published schedule. The note, when receiving television, is about that of middle "C" modulated fifteen times a second. Between each picture, announcement is made by phone.

After getting the best signal strength possible, cut out the loud speaker, and cut in the neon tube.

Now start the disc, which must be rotated at 900 R.P.M. This speed is used most at present. A help in synchronizing may be obtained by placing a small Westinghouse Neon sign lamp across the 60 cycle house current and observing it through four small holes in the revolving scanning disc, at 90 deg. each on the periphery of a 4 inch circle. When synchronism is obtained, the neon light will either look dark or look as though only one side is lighted. When very close to synchronism, it will appear as though darks bands are slowly passing in front of the light. First, one side of the light will appear lighted, and then the other. These bands move at a speed proportional to the slip of the motor at the 900 R.P.M. synchronous speed.

The picture appears on the disc when viewing the neon tube through the holes. The frame between the disc and the tube is the size of the picture to cut off all other light which would cause a series of pictures on the periphery of the spiral of holes. The picture is as high as the spiral's last hole is displaced from the first hole (radially). The picture has a width equal to the distance between any two adjacent holes. Our picture is about one inch square.

The picture may be upside down, or it may be wrong right and left, like looking at a photograph in a mirror. Right and left correction is obtained by reversing the motor, while if the picture is upside down, the disc must be taken off, turned around, and put on with the other side of the disc next to the lamp.

The only further condition about which one

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needs to bother is whether the picture is negative or positive. To change from one to the other, perhaps the best way is to add another step of amplification, although it can be done by substituting a "C" battery bias for the grid leak and grid condenser.

One thing which the beginner does not fully appreciate, is that static and other interference which may ruin a phone program does not always prevent the reception of television. But a 60 cycle hum which may be nearly inaudible to the ear, will cause 4 black bands across the picture.

COST

Working on television is extremely interesting and the results obtained will more than repay any one for the little time and trouble he takes to construct it and get the apparatus working properly.

Due to the fact that most amateurs have most of the necessary apparatus for the receiving set, the only extra cost would be the neon tube, scanning disc, motor, and a few incidentals. The scanning disc may be bought for from twenty-five cents to ten dollars. Our particular type disc may be obtained for about six dollars. The raytheon Kino-Lamp costs $4.41, although a small Westinghouse Neon lamp operating on a .1 watt at 110 volts may be obtained for less than one dollar.

Some people have made television translators for as low as $5.00.